PRECALCULUS PREEXAM1 SOLUTION

1) $|x+6| = \frac{1}{x+3} + 4$

$x+6 = \frac{1}{x+3} + 4$

$(x+3)(x+6) = \frac{1}{x+3}(x+3) + 4(x+3)$

$x^2 + 9x + 18 = 1 + 4x + 12$

$x^2 + 9x + 18 - 1 - 4x + 12 = 0$

$x^2 + 5x + 5 = 0$

Quadratic Formula

$x = \frac{-5 \pm \sqrt{(-5)^2 - 4(1)(5}}{2(1)}$

$x = \frac{-5 \pm \sqrt{25 - 20}}{2}$

$\boxed{x = \frac{-5 \pm \sqrt{5}}{2}}$ MUST TEST EACH ONE

OR $x+6 = -\left(\frac{1}{x+3} + 4\right)$

$x+6 = -\frac{1}{x+3} - 4$

$(x+3)(x+6) = -\frac{1}{x+3}(x+3) - 4(x+3)$

$x^2 + 9x + 18 = -1 - 4x - 12$

$x^2 + 9x + 18 + 1 + 4x + 12 = 0$

$x^2 + 13x + 31 = 6$

Quadratic formula

$x = \frac{-13 \pm \sqrt{(-13)^2 - 4(1)(31}}{2(1)}$

$x = \frac{-13 \pm \sqrt{169 - 124}}{2}$

$x = \frac{-13 \pm \sqrt{45}}{2}$

$x = \frac{-13 \pm \sqrt{9 \cdot 5}}{2}$

$x = \frac{-13 \pm 3\sqrt{5}}{2} = \boxed{\frac{1}{2}(13 \pm 3\sqrt{5})}$

MUST TEST EACH ONE

B. $\left[x = \frac{10}{\sqrt{5}-5}, x = \frac{-10}{\sqrt{5}-5}, x = \frac{62}{3\sqrt{5}-13}\right]$

ANSWER CHOICE

$x = \frac{10}{\sqrt{5}-5} = \frac{10}{\sqrt{5}-5}\left(\sqrt{5}+5\right)$

$= \frac{10(5+\sqrt{5})}{5-25} = \frac{1}{2}(5+\sqrt{5})$

2) $64^{8x-4} = 65536$

$\log 64^{8x-4} = \log 65536$

$(8x-4)\frac{\log 64}{\log 64} = \frac{\log 65536}{\log 64}$

$(8x-4) = \frac{\log 65536}{\log 64}$

$8x - 4 = \frac{8}{3}$

$8x = \frac{8}{3} + 4$

$8x = \frac{20}{3}$

$x = \frac{\frac{20}{3}}{8}$

$\boxed{x = \frac{5}{6}}$

$\frac{\log 65536}{\log 64}$

$= \log_{64} 65536$

$= \log_{2^6} 65536$

$= \frac{1}{6}\log_2 65536$

$= \frac{1}{6}\log_2 (2^{16})$

$= \frac{1}{6} \cdot 16 \log_2 2$

$= \frac{1}{6} \cdot 16 \cdot 1$

$= \frac{8}{3}$

log rules:

$\frac{\log_c(b)}{\log_c(a)} = \log_a b$

$\log_{a^b}(x) = \frac{1}{b}\log_a(x)$

$\log_a(x^b) = b \cdot \log_a(x)$

$\log_a a = 1$

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3) $g(x) = 5x^2 - 6$

$\frac{g(x-h) - g(x)}{h}$

$\frac{(5(x+h)^2 - 6) - (5x^2 - 6)}{h} = \frac{10xh + 5h^2}{h}$

$5(x^2 + 2xh + h^2) - 6 - 5x^2 + 6$

$5x^2 + 10xh + 5h^2 - 6 - 5x^2 + 6$

$10xh + 5h^2$

$\frac{10xh}{h} + \frac{5h^2}{h}$

$= \boxed{10xh + 5h}$

4) $\frac{-2}{x^2-1} + \frac{1}{x-1} - \frac{3}{(x^2-1)(x-1)} = \frac{1}{x^2-1}$

$\frac{-2(x^2-1)(x-1)}{x^2-1} + \frac{1(x^2-1)(x-1)}{x-1} - \frac{3(x^2-1)(x-1)}{(x^2-1)(x-1)} = \frac{1(x^2-1)(x-1)}{x^2-1}$

$-2(x-1) + 1(x^2-1) - 3 = 1(x-1)$

$-2x + 2 + x^2 - 1 - 3 = x - 1$

$x^2 - 2x - 2 = x - 1$

$x - 3x - 1 = 0$

Quadratic Formula

$x = \frac{-b \pm \sqrt{(6)^2 - 4ac}}{2(a)}$

$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-1)}}{2(1)}$

$= \frac{3 \pm \sqrt{9+4}}{2}$

$\rightarrow x = \frac{3 \pm \sqrt{13}}{2}$

$x = \frac{3}{2} + \frac{\sqrt{13}}{2}$ or $x = \frac{3}{2} - \frac{\sqrt{13}}{2}$

$x = \frac{1}{2}\sqrt{13} + \frac{3}{2}$ or $-\frac{1}{2}\sqrt{13} + \frac{3}{2}$

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5) $\left(\frac{1}{125}\right)^{6x+5} = 5^{-x-3}$

Exponent rule

$(a^b)^c = a^{bc}$

$\left(5^{-3}\right)^{6x+5} = 5^{-x-3}$

$5^{-3(6x+5)} = 5^{-x-3}$

$-3(6x+5) = -x-3$

$-18x - 15 = -x - 3$

$\frac{-12}{17} = \frac{17x}{17}$

$x = -\frac{12}{17}$

6) $A \neq 0$, $f(t) = Ae^{(-t)}$

$f(t) = \frac{1}{5}A$

$\frac{1}{5}A = Ae^{-t}$

since $A \neq 0$

$\frac{1}{A}\left(\frac{1}{5}A\right) = \frac{1}{A}\left(Ae^{-t}\right)$

$\frac{1}{5} = e^{-t}$

$\ln\left(\frac{1}{5}\right) = \ln\left(e^{-t}\right)$

$\ln\frac{1}{5} = -t\ln e$

$\ln\frac{1}{5} = -t$

$\ln(5^{-1}) = -t$

$-1\ln 5 = -t$

$\boxed{t = \ln 5 \text{ or } t = \log 5}$

Log Rules:

$\log = \ln$

$\ln = \log_e$

$\ln e = 1$

$\log_a(x^b) = b \cdot \log_a(x)$

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7) $q(x) = x$, $q(u-2)$

$\boxed{q(u-2) = u-2}$

8) $x \heartsuit y = |x-y|$

$2(x \heartsuit y) = 2y \heartsuit 2x$

$x \heartsuit y = y - x$

$x \heartsuit x = 0$

$x \heartsuit y > 0$

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9) $r = 8\%, \; x = 15$

$$\frac{r}{1+\frac{1}{1+\frac{1}{x}}} \longrightarrow \frac{8}{1+\frac{1}{1+\frac{1}{15}}} = \frac{8}{1+\frac{1}{\frac{16}{15}}} = \frac{8}{1+1\cdot\frac{15}{16}}$$

$$\frac{1(15)}{1(15)} + \frac{1}{15} = \frac{15}{15} + \frac{1}{15} = \frac{16}{15}$$

$$\frac{8}{1+\frac{15}{16}} = \frac{8}{\frac{31}{16}} = 8 \cdot \frac{16}{31}$$

$$\frac{1(16)}{1(16)} + \frac{15}{16} = \frac{16}{16} + \frac{15}{16} = \frac{31}{16}$$

$$\boxed{\frac{128}{31}\%}$$

10) $f(x) = 2x$, $f(-10y) = -10f(y)$

$f(-10y) = -10f(y)$

$2(-10y) = -10(2y)$

$-20y = -20y$

True

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11) $p(x) = -4x^2 + 2$, $p\left(\frac{y-4}{\beta-4}\right)$

$p\left(\frac{y-4}{\beta-4}\right) = -4\left(\frac{y-4}{\beta-4}\right)^2 + 2$

$$\boxed{\frac{-4(y-4)^2}{(\beta-4)^2} + 2}$$

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12) $6000 \cdot (6000)^{6000}$

$6000 \cdot (6000)^{6000} = \boxed{6000^{6001}}$

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13) $\frac{6y^4 + 2x}{2x^3 - 2y} = \frac{(6y^4 + 2x)^{\frac{1}{2}}}{(2x^3 - 2y)^{\frac{1}{2}}} = \boxed{\frac{3y^4 + x}{x^3 - 2y}}$

14) $x = \frac{5m+3}{2}$, $y = \frac{5m+9}{2}$, $z = \frac{2m+6}{2}$

$$\frac{x+y+z}{3} = ?$$

$$\frac{\frac{5m+3}{2} + \frac{5m+9}{2} + \frac{2m+6}{2}}{3}$$

$$\frac{5m}{2} + \frac{3}{2} + \frac{5m}{2} + \frac{9}{2} + \frac{2m}{2} + \frac{6}{2} = \frac{12m}{2} + \frac{18}{2}$$

$$\frac{6m+9}{3} = \frac{6m}{3} + \frac{9}{3} = \boxed{2m+3}$$

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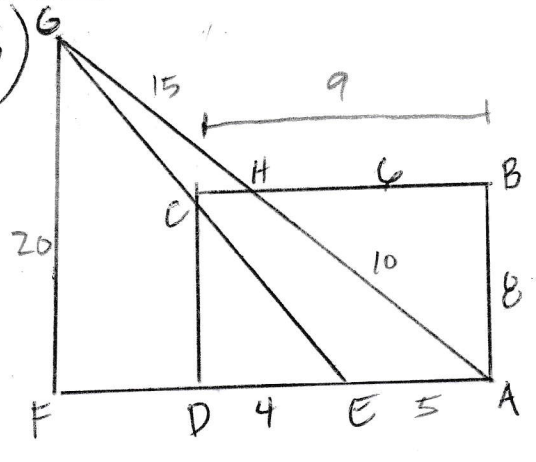
15)



STEP 1:

$HA^2 = 8^2 + 6^2$

$HA^2 = 64 + 36$

$\sqrt{HA^2} = \sqrt{100}$

$HA = 10$

STEP 2: $\triangle GCH \sim \triangle GEA$

$$\frac{GH}{GA} = \frac{CH}{EA}$$

$$\frac{GH}{GH+10} = \frac{3}{5}$$ cross multiply

$3GH + 30 = 5GH$

$30 = 2GH$

$GH = \frac{30}{2} = \underline{15}$

STEP 3:

$HA + GH = GA$

$10 + 15 = GA$

$GA = 25$

STEP 4: $\triangle GFA \sim \triangle ABH$

$$\frac{GA}{HA} = \frac{GF}{BA}$$

$$\frac{25}{10} = \frac{GF}{8}$$

$$\frac{200}{10} = GF$$

$\boxed{GF = 20}$

16) $\frac{x+1}{2} = 3(2x+2)$

$\frac{x+1}{2} = 6x+6$

$2\left(\frac{x+1}{2}\right) = (6x+6)2$

$x+1 = 12x+12$

$-11 = 11x$

$\frac{11x}{11} = \frac{-11}{11}$

$\boxed{x = -1}$

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17) $\boxed{(ab)^4 = a^4 \cdot b^4}$

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18) $(4x^5 + 2x^2 + 5) \div (2x^3)$

$\frac{4x^5 + 2x^2 + 5}{2x^3} = \frac{4x^5}{2x^3} + \frac{2x^2+5}{2x^3} = \boxed{2x^2 + \frac{2x^2+5}{2x^3}}$

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19) $\frac{2x+2}{3} = 3(x-1)$

$\frac{2x+2}{3} = 3x-3$

$3\left(\frac{2x+2}{3}\right) = (3x-3)3$

$2x+2 = 9x-9$

$11 = 7x$

$\frac{7x}{7} = \frac{11}{7}$

$\boxed{x = \frac{11}{7}}$

20) $(x+y)^3$

$(x+y)(x+y)(x+y)$

$(x+y)(x^2+2xy+y^2)$

$x^3+2x^2y+xy^2+x^2y+2xy^2+y^3$

$=\boxed{x^3+3x^2y+3xy^2+y^3}$