2.6. 28. $\lim_{x\to-\infty}\left(\sqrt{4x^2+3x}+2x\right) =$

$$\lim_{x\to-\infty}\left(\sqrt{4x^2+3x}+2x\right)\left(\frac{\sqrt{4x^2+3x}-2x}{\sqrt{4x^2+3x}-2x}\right) =$$

$$\lim_{x\to-\infty}\frac{4x^2+3x-4x^2}{\sqrt{4x^2+3x}-2x} =$$

$$\lim_{x\to-\infty}\frac{3}{\frac{1}{x}\sqrt{4x^2+3x}-2} =$$

$$\lim_{x\to-\infty}\frac{3}{\sqrt{4+\frac{3}{x}}-2} =$$

$$\infty$$

2.6. 36. $\lim_{x\to\infty}\frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} =$

$$\lim_{x\to\infty}\frac{e^{3x}-\frac{1}{e^{3x}}}{e^{3x}+\frac{1}{e^{3x}}} = 1$$

2.6. 38. $\lim_{x\to\infty}\frac{\sin^2 x}{x^2+1} = 0$, because $-1 \le \sin x \le 1$,

so $0 \le \sin^2 x \le 1$, and x^2+1 goes to ∞

as x goes to ∞.

2.7 32. $f(t) = 2t^3 + t$

$$f'(t) = \lim_{h\to 0} \frac{f(t+h) - f(t)}{h} =$$

$$\lim_{h\to 0} \frac{2(t+h)^3 + (t+h) - 2t^3 - t}{h} =$$

$$\lim_{h\to 0} \frac{2(t^3 + 3t^2h + 3th^2 + h^3) + h - 2t^3}{h} =$$

$$\lim_{h\to 0} \frac{6t^2h + 6th^2 + 2h^3 + h}{h} =$$

$$\lim_{h\to 0} 6t^2 + 6th + 2h^2 + 1 =$$

$$6t^2 + 1$$

$$f'(a) = 6a^2 + 1$$

2.7. 36. $f(x) = \dfrac{4}{\sqrt{1-x}}$

$$f'(a) = \lim_{t \to a} \frac{\frac{4}{\sqrt{1-t}} - \frac{4}{\sqrt{1-a}}}{t-a} =$$

$$\lim_{t \to a} \frac{4\sqrt{1-a} - 4\sqrt{1-t}}{(t-a)\sqrt{(1-t)(1-a)}} =$$

$$\lim_{t \to a} \frac{4(\sqrt{1-a} - \sqrt{1-t})}{(t-a)\sqrt{(1-t)(1-a)}} \frac{\sqrt{1-a} + \sqrt{1-t}}{\sqrt{1-a} + \sqrt{1-t}} =$$

$$\lim_{t \to a} \frac{4(1-a-(1-t))}{(t-a)(1-a)\sqrt{1-t} + (t-a)(1-t)\sqrt{1-a}} = \lim_{t \to a} \frac{4}{(1-a)\sqrt{1-t} + (1-t)\sqrt{1-a}}$$

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

28. 22. $f(x) = mx + b$.

$$f'(x) = \lim_{h \to 0} \frac{m(x+h) + b - mx - b}{h}$$

$$= \lim_{h \to 0} \frac{mx + mh + b - mx - b}{h}$$

$$= \lim_{h \to 0} \frac{mh}{h}$$

$$= m$$

domain of $f(x)$ is $(-\infty, \infty)$,

domain of $f'(x)$ is $(-\infty, \infty)$.

28. 26 $g(t) = \frac{1}{\sqrt{t}}$

$$g'(t) = \lim_{x \to t} \frac{\frac{1}{\sqrt{x}} - \frac{1}{\sqrt{t}}}{x - t} =$$

$$\lim_{x \to t} \frac{\sqrt{t} - \sqrt{x}}{\sqrt{xt}(x-t)} =$$

$$\lim_{x \to t} \frac{(\sqrt{t} - \sqrt{x})(\sqrt{t} + \sqrt{x})}{\sqrt{xt}(x-t)(\sqrt{t} + \sqrt{x})} =$$

$$\lim_{x \to t} \frac{t - x}{\sqrt{xt}(t-x)(-1)(\sqrt{t} + \sqrt{x})} =$$

$$\lim_{x \to t} \frac{1}{\sqrt{xt}(-1)(\sqrt{t} + \sqrt{x})} =$$

$$\frac{1}{-t(2\sqrt{t})} = -\frac{1}{2\sqrt{t^3}}$$

$$= -\frac{1}{2} t^{-\frac{3}{2}}$$

domain of $g(t)$ is $(-\infty, 0) \cup (0, \infty)$

domain of $g'(t)$ is $(-\infty, 0) \cup (0, \infty)$

2.8. 50. $a = b'$, because $a \geq 0$ for all x's. and b is the only function that is increasing for all x's.

$c = d'$, because c intercepts with the x-axis two times, at which d has ~~creas~~ a crest and a dip.

$b = c'$, because c decreases for $x \leq 0$, and increases for $x \geq 0$. ~~b B~~ And $b \leq 0$ for $x \leq 0$ and $b \geq 0$ for $x \geq 0$.

So f is d
f' is c
f'' is b
f''' is a