MATH 1712 D1-D3 **Quiz #2** **Full Name** Key *(Print)*

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Circle your TA's name: D1 – Lacy Hardcastle D2 – Kyla Hewell D3 – Kelly Robinson

1. Find the derivative of each function.

(a) $f(x)=3x^5+\sqrt{x}+\frac{1}{x^3}$ $= 3x^5 + x^{\frac{1}{2}} + x^{-3}$

$f'(x) = 3(5x^4) + \frac{1}{2}x^{-\frac{1}{2}} - 3x^{-4}$

(10 pts.) $f'(x) = 15x^4 + \frac{1}{2}x^{-\frac{1}{2}} - 3x^{-4}$

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

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

(10 pts.)

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

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

2. Find an equation of the line that is tangent to the curve $3x^3+5y^2-y^4=1$ at $(x, y)=(-1,1)$.

Use implicit differentiation.

$\frac{d}{dx}(3x^3+5y^2-y^4) = \frac{d}{dx}1$

(15 pts.) $3(3x^2) + 5(2y\frac{dy}{dx}) - 4y^3\frac{dy}{dx} = 0$

$10y\frac{dy}{dx} - 4y^3\frac{dy}{dx} = -9x^2$

$\frac{dy}{dx}(10y - 4y^3) = -9x^2$

$\frac{dy}{dx} = \frac{-9x^2}{10y-4y^3}$

$\left.\frac{dy}{dx}\right|_{(x,y)=(-1,1)} = \frac{-9(-1)^2}{10(1)-4(1)^3} = \frac{-9}{6} = -\frac{3}{2}$

$y-y_1 = m(x-x_1)$

$(x_1, y_1) = (-1, 1)$

$m = \left.\frac{dy}{dx}\right|_{(x,y)=(-1,1)} = -\frac{3}{2}$

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

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3. Consider the demand equation $f(p) = -25p + 1000$, where f represents the quantity demanded per day, and p represents the unit price $(0 \le p \le 20)$.

(a) Compute the elasticity of demand, $E(p) = -\frac{pf'(p)}{f(p)}$.

(8 pts.)

$f'(p) = -25$

$E(p) = \frac{-p(-25)}{-25p + 1000}$

$\boxed{E(p) = \frac{25p}{-25p + 1000}}$

(b) Is demand elastic, unitary, or inelastic when $p = 10$?

(4 pts.)

$E(10) = \frac{25(10)}{-25(10) + 1000}$

$= \frac{250}{-250 + 1000}$

$= \frac{250}{750} = \frac{3}{4} < 1$

The demand is inelastic.

(c) If the price is \$10, will raising the unit price slightly cause the revenue to increase or decrease?

(3 pts.)

The demand is inelastic, so raising the price slightly at the current level of \$10 will increase the revenue.

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3. Consider the demand equation f (p) = -25 p +1000 , where f represents the quantity demanded per day, and p represents the unit price (0 3 p 5 20).

(a) Compute the elasticity of demand, E (p) = -3-QJE.

9* f(P)

l (b) Is demand elastic, unitary, or inelastic when p =10 ?

(c) If the price is $10, will raising the unit price slightly cause the revenue to increase or decrease?