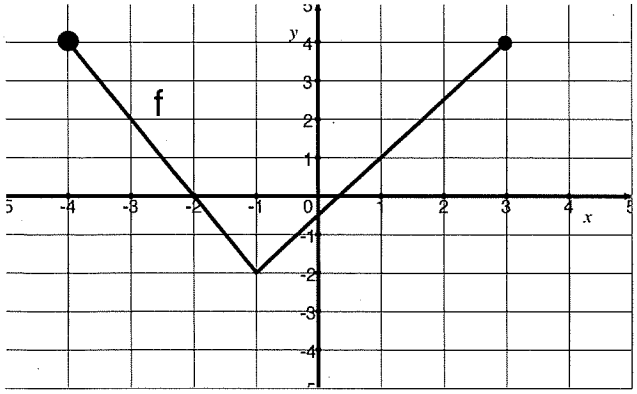
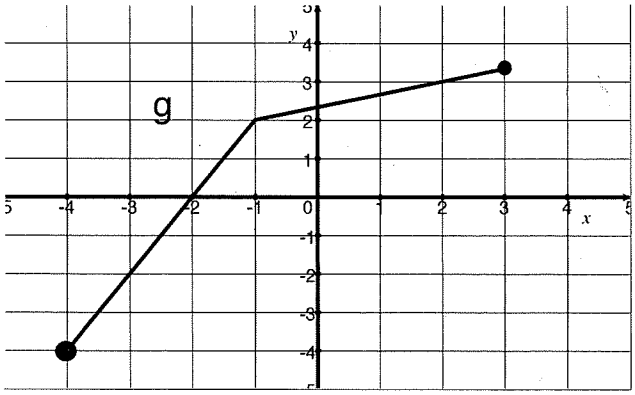
TMATH 124 MW: Quiz 3

Key

Show *all* your work (numerically, algebraically, or geometrically) for each and simplify. No credit is given without supporting work.

1. (ProductWks #1) Let f be the function graphed on the left and g be the function graphed on the right.





[1] (WebHW7 #4)
Find $\frac{d}{dx}(8e^x + f(x))|_{x=2}$

$8e^x + \frac{df}{dx}\Big|_{x=2}$ piece by piece (+.5) get it (+.5)

$8e^2 + \frac{3}{2}$

[2] (ProductWks #1)
Estimate $\frac{d}{dx}(f \cdot g)|_{x=-2}$

Product rule (+.5) plugged in -2 (+.5)

$f(-2)g'(-2) + f'(-2)g(-2)$

$\underbrace{0 \cdot 2}_{+.5} + \underbrace{-2 \cdot 0}_{+.5} = 0$

[2] (WebHW8 #7)
Approximate $(f/g)'(-3)$

quotient rule (+.5) plugged in -3 (+.5)

$\frac{g(-3)f'(-3) - f(-3)g'(-3)}{(g(-3))^2}$

$= \frac{(-2)(\overset{+.5}{-2}) - (2)(\overset{+.5}{2})}{(-2)^2}$

$= \frac{4 - 4}{4} = 0$

2. [2] (§3.2 #2) Let $f(x) = \dfrac{x^5 - 3x^2 + \sqrt{x}}{x^2}$. Find $f'(x)$.

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

$= x^3 - 3 - x^{-3/2}$

$f'(x) = 3x^2 - 0 - \left(-\frac{3}{2}\right)x^{-5/2}$

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

(simplified first)

or quotient rule (+.5)

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

$= \dfrac{x^2(5x^4 - 6x + \frac{1}{2}x^{-1/2}) - (x^5 - 3x^2 + x^{1/2})\cdot 2x}{x^4}$ (+.5) (+.5)

get it (+.5)

3. [3] (§3.1 #54) Find the equation of the line tangent to $f(x) = x^{\frac{3}{2}}$ that is parallel to the line $y - 8 = 6(x + 5)$

(+.5) looking for a line $y = mx + b$ or $y - y_1 = m(x - x_1)$

(+.5) m = slope of the line $y - 8 = 6(x+5)$

$= 6$

(+.5) need to find the point (x, y) so that

slope of line tangent to f @ x = slope of the line $y - 8 = 6(x+5)$

$f'(x) = 6$

$\frac{3}{2}x^{1/2} = 6$ (+.5)

$x^{1/2} = 4$

$x = 16$ (+.5)

3/16
6
-96

so passes thru $(16, 16^{3/2})$ or $(16, 64)$ (+.5)

So $64 = 6(16) + b$

$64 - 96 = b$

$-32 = b$

So $y = 6x - 32$

or $y - 64 = 6(x - 16)$