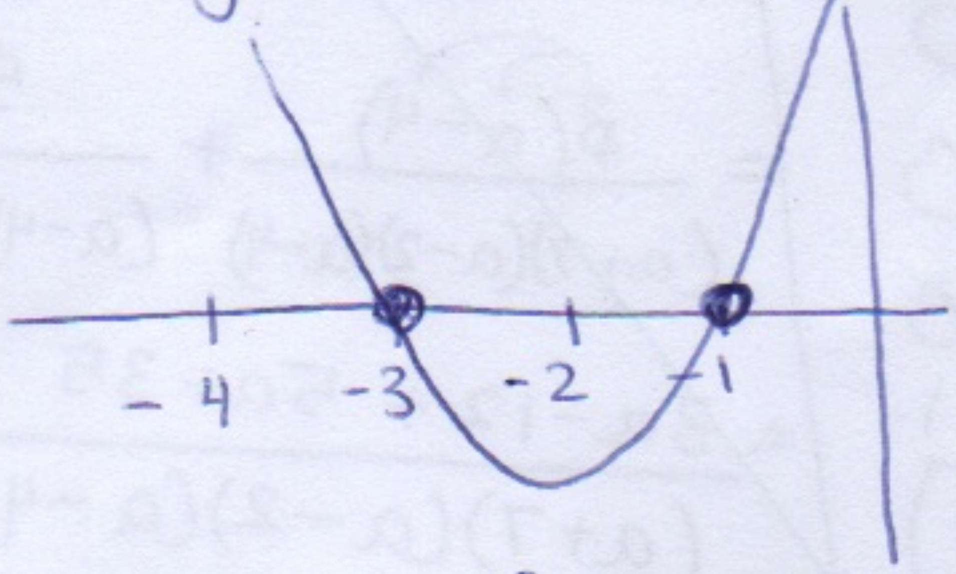
Calculus 3A Test 2 Solutions Spring 2018 p. 1

1. $f'(-3) = 0$
$f'(-1) = 0$
f' is positive: $(-\infty, -3), (-1, \infty)$
f' is negative: $(-3, -1)$



2a. $f(x) = ax^{-12} + be^x$
$\boxed{f'(x) = -12ax^{-13} + be^x}$

2b. $\boxed{y' = \dfrac{5(5+\sqrt{t}) - 5t\left(\frac{1}{2\sqrt{t}}\right)}{(5+\sqrt{t})^2}}$

2c. $\boxed{y' = 9(\tan^{-1}x)^8\left(\dfrac{1}{1+x^2}\right)}$

2d. $\boxed{f'(x) = \sec^2[\ln(ax+b)] \cdot \dfrac{1}{ax+b} \cdot a}$

3. $y' = 4\sin x + 4x\cos x$
$m = y'\left(\frac{3\pi}{2}\right) = 4\sin\left(\frac{3\pi}{2}\right) + 4\left(\frac{3\pi}{2}\right)\cos\left(\frac{3\pi}{2}\right)$
$= 4(-1) + 4\left(\frac{3\pi}{2}\right)(0)$
$= -4$
$y - y_1 = m(x - x_1)$
$y - -6\pi = -4\left(x - \frac{3\pi}{2}\right)$
$y + 6\pi = -4x + 6\pi$
$-6\pi \quad\quad -6\pi$
$\boxed{y = -4x}$

4a. $(fg)'(3) = f'(3)g(3) + f(3)g'(3)$
$= -6(-8) + 7(9)$
$= 48 + 63$
$= \boxed{111}$

4b. $\left(\frac{f}{g}\right)'(3) = \dfrac{f'(3)g(3) - f(3)g'(3)}{[g(3)]^2}$
$= \dfrac{-6(-8) - 7(9)}{(-8)^2}$
$= \dfrac{48 - 63}{64}$
$= \boxed{\dfrac{-15}{64}}$ $\approx -.23$

5. $f'(x) + 5x^4[f(x)]^3 + x^5 \cdot 3[f(x)]^2 f'(x) = 0$
$f'(2) + 5(2)^4[f(2)]^3 + 2^5 \cdot 3[f(2)]^2 f'(2) = 0$
$f'(2) + 80[3]^3 + 96[3]^2 f'(2) = 0$
$f'(2) + 2160 + 864f'(2) = 0$
$-2160 \quad\quad -2160$
$f'(2) + 864f'(2) = -2160$
$f'(2)(1 + 864) = -2160$
$\dfrac{865f'(2)}{865} = \dfrac{-2160}{865}$
$\boxed{f'(2) = -\dfrac{432}{173}}$

≈ -2.5