1/21

① $\sqrt{x^2+17^2} = x+17$ FALSE (unless $x=0$)

② $e^{t+23} = e^t \cdot e^{23}$ TRUE

③ $\frac{1}{a+9} = \frac{1}{a} + \frac{1}{9}$ FALSE (unless $a = 9\left(-\frac{1}{2} \pm i\frac{\sqrt{3}}{2}\right)$)

④ $\tan(17x) = (17x)\tan$ FALSE

⑤ $\tan(17x) = 17\tan x$ FALSE (unless x falls in a particular set (that's countable))

⑥ $\frac{d}{dx}(x^2 \sin x) = 2x\cos x$ FALSE

⑦ $s^2+4s+4 = (s+2)^2$ TRUE

⑧ $\log(m+5) = \log(m)\cdot\log(5)$ FALSE (unless m is a root of m^5-m-5 (only one of which is real))

⑨ $\int x^2 \cos(x^3)\,dx = \int \frac{1}{3}\cos u\,du$ if $u = x^3$, $du = 3x^2\,dx$

$= \frac{1}{3}\sin u + C$

$= \frac{1}{3}\sin(x^3) + C$

⑩ Use partial fractions:

$$\frac{1}{b^2+b-6} = \frac{1}{(b+3)(b-2)} = \frac{1}{5}\cdot\frac{1}{b-2} - \frac{1}{5}\cdot\frac{1}{b+3}$$

(Either match like coeffs in a recombined frac or eval @ $b=2$ & $b=-3$ to get the $1/5$ & $-1/5$)

(16) (cont)

$$\int \frac{db}{b^2+b-6} = \frac{1}{5}\int \frac{db}{b-2} - \frac{1}{5}\int \frac{db}{b+3}$$

$$= \frac{1}{5}\log|b-2| - \frac{1}{5}\log|b+3| + C$$

(11) $\int u\,dv = uv - \int v\,du$

$$\int t^2 \cos t\,dt = t^2 \sin t - \int 2t \sin t\,dt$$

$u = t^2 \qquad v = \sin t$

$du = 2t\,dt \qquad dv = \cos t\,dt$

$$= t^2 \sin t - \left(-2t\cos t - \int -2\cos t\,dt\right)$$

$u = 2t \qquad v = -\cos t$

$du = 2dt \qquad dv = \sin t\,dt$

$$= t^2 \sin t + 2t\cos t - 2\sin t + C$$

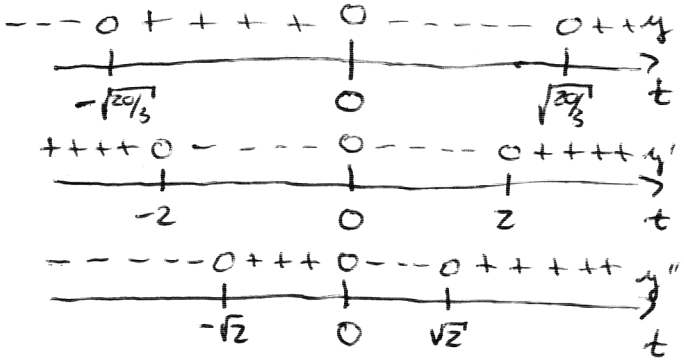
(Yes, the sign on $-2\sin t$ is correct.)

(12)

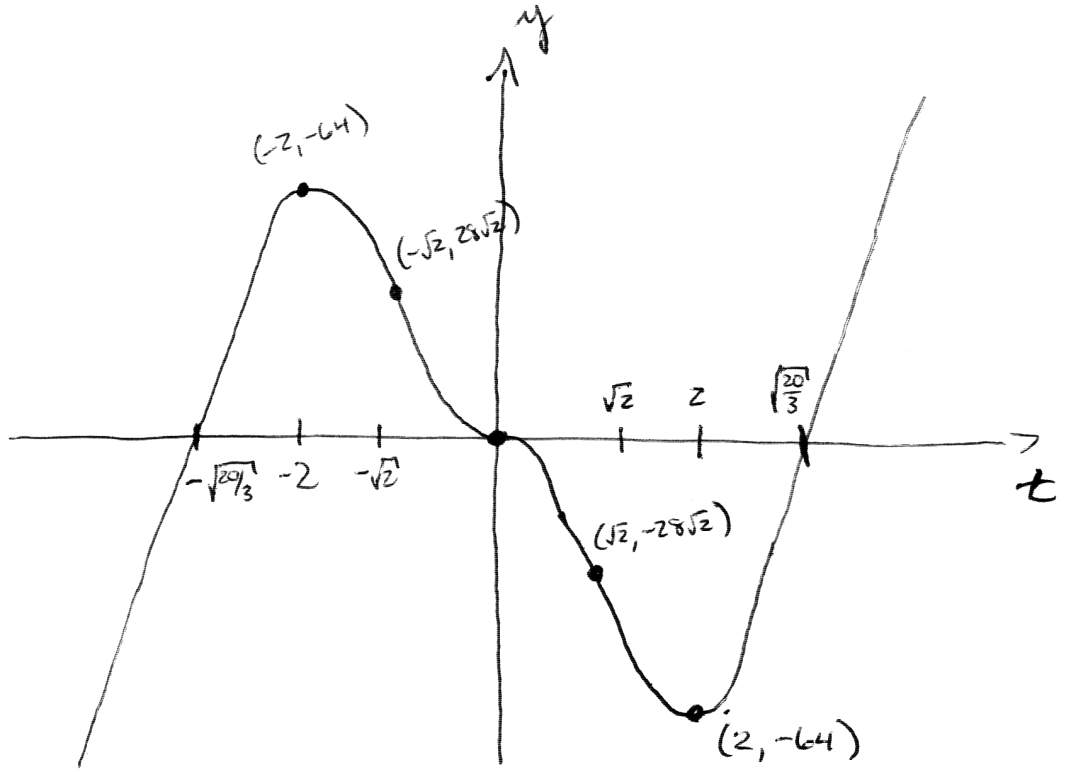
$$y = 3t^5 - 20t^3$$

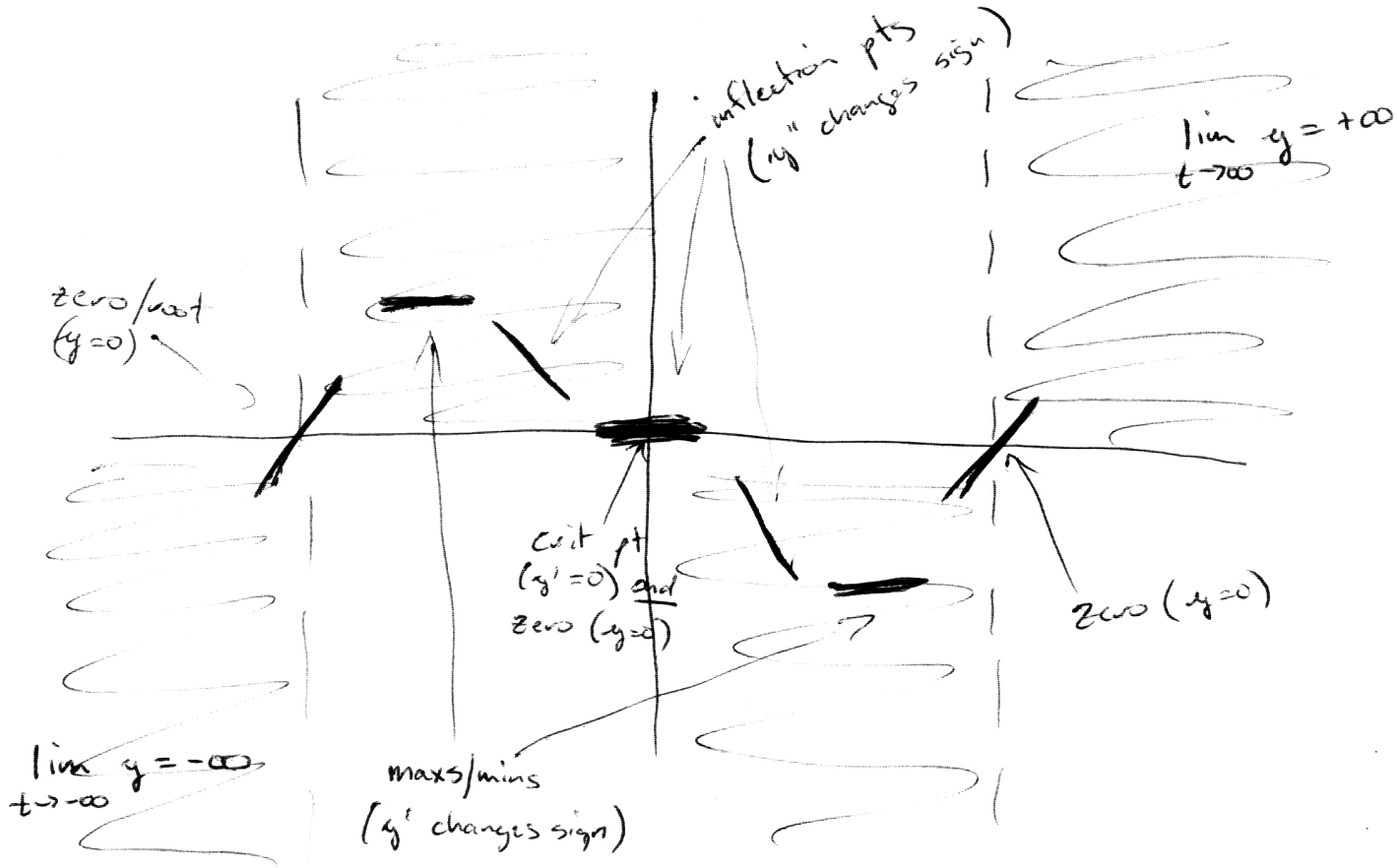
$$y' = 15t^4 - 60t^2$$

$$y'' = 60t^3 - 120t$$



(12)


y
t
(-2, -64)
(-√2, 28√2)
(√2, -28√2)
(2, -64)
-√(20/3)
-2
-√2
√2
2
√(20/3)


inflection pts
("y" changes sign)
lim y = +∞
t→∞
zero/root
(y=0)
crit pt
(y'=0) and
zero (y=0)
zero (y=0)
lim y = -∞
t→-∞
maxs/mins
(y' changes sign)